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Wouter Eyckmans

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MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP
300 S. WACKER DRIVE
32ND FLOOR
CHICAGO, IL 60606

EXAMINER

JOHNSON, RYAN

ART UNIT

PAPER NUMBER

2817

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/584,700	Applicant(s) EYCKMANS ET AL.	
	Examiner Ryan Johnson	Art Unit 2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,7,13,21-25,27-30 and 32 is/are rejected.
- 7) ☒ Claim(s) 3,4,6,8-12,14-20,26 and 31 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 February 2010 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>4/1/10</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Application No. 60/533,323, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. Specifically, the prior-filed application is directed to a device allowing magnetic property interaction, but does not explicitly disclose any devices capable of generating an oscillating signal.

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on April 1, 2010 was filed after the mailing date of the non-final action on September 21, 2009. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 2, 5, 7, 13, 21-25, 27-30, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiselev et al. ("Microwave Oscillations of a Nanomagnet Driven by a Spin-polarized Current", as cited previously by Applicant and hereinafter "Kiselev") in view of Lagae et al. ("On-chip Manipulation and Magnetization Assessment

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of Magnetic Bead Ensembles by Integrated Spin-Value Sensors”, as cited previously and hereinafter “Lagae”).

7. Due to the use of "a means for" and "an integrated means", rather than "means for...", the Examiner is not interpreting claim 1 under 112(6). If the claim is to be under 112(6), the Examiner suggests using "means for..." language rather than "a means for" or "an integrated means". The Examiner is therefore interpreting claim 1 under the broadest reasonable interpretation.

8. Regarding independent claim 1, Kiselev discloses a device for generating an oscillating signal (see Fig.1), the device comprising:

a means for providing a current of spin polarized charge carriers (the “fixed” Co layer, which produces a spin-polarized current for the “free” Co layer; see page 380, second column, lines 1-3);

a magnetic excitable layer (the “free” Co layer) adapted for receiving said current of spin polarized charge carriers thus generating an oscillating signal with a frequency V_{osc} (see page 380, second column, first paragraph); and

a means (a magnetic field generator; see page 380, second column, lines 10-13), different from said means for providing a current of spin polarized charge carriers (the magnetic field generation is different than the "fixed" layer providing spin-polarized current), for interacting with said magnetic excitable layer to thereby select said oscillation frequency (see page 380, second column, lines 10-13 and page 382, final paragraph).

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9. Regarding claims 2, 29 and 32, Kiselev discloses a method for generating oscillations, the method comprising:

providing a current of spin polarized charge carriers (via the "fixed" Co layer; see page 380, second column, lines 1-3), thus generating an oscillating signal with an oscillation frequency ν_{osc} by interaction between said current of spin polarized charge carriers and a magnetic excitable layer (a frequency is generated by interactions between the spin polarized current generated by the "fixed" Co layer and the "free", i.e. magnetic excitable, layer; see page 380, second column, lines 10-13);

controllably tuning said oscillation frequency by inducing an interaction between a means, different from said means for providing a current of spin polarized charge carriers, and said magnetic excitable layer (see Fig.1(e), where the frequency of the oscillator is tuned via the magnetic field generator, different from the "fixed" layer); and

measuring an excitation caused by said spin polarized charge carriers (see Fig.1(a) and page 380, second column, paragraph 3, which discusses measuring the microwave power by use of a heterodyne mixer).

10. The only difference between the recited invention of claims 1, 29, and 32 is that the means to tune or determine the oscillation frequency (different than the means for providing spin-polarized current) is not explicitly disclosed as integrated. In other words, the magnetic field generator used to tune the oscillator (see Fig.1(e)) is not explicitly disclosed as "integrated". Lagae discloses an integrated system (see Fig.1), where the magnetic field generator is integrated with the overall circuit and provides a magnetic field to a sensor by use of two current conductor lines (see Fig.1, abstract). One of skill

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in the art would have recognized the benefit of providing an integrated magnetic field generator as a reduction of space and ease of manufacture. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the integrated magnetic field generator of Lagae with the microwave oscillator of Kiselev in order to have provided the benefits of reduced size and ease of manufacture.

11. Regarding claims 5 and 30, Kiselev discloses the interacting performing a magnetostatic interaction (i.e. an application of a static magnetic field; see page 380, second column, lines 10-13).

12. Regarding claim 7, Kiselev discloses a means for generating a magnetic bias field to bias the magnetic excitable layer (see page 380, second column, lines 10-13, where a static magnetic field is generated)

13. Regarding claim 13, in the combination of Kiselev and Lagae, the magnetic field generator of Lagae comprises an interacting layer (i.e. "current lines" of Fig.1) that is coupled via magneto-statically to the magnetic excitable layer (i.e. the magnetic field generator of Lagae generates a static magnetic field required by Kiselev, thus is magnetostatically coupled to the "free" layer).

14. Regarding claim 21, Kiselev discloses the means for providing current... abutting on the magnetic excitable layer (see Fig.1(a)) and comprising an electrode (top/bottom Copper layer), a spin polarization means (the "fixed" Co layer) and a current confinement structure ("SiO₂ insulator").

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15. Regarding claim 22, Kiselev discloses the means for providing spin polarized charge carriers as a “fixed” layer (which by definition must have a constant magnetic polarization; see page 380, second column, lines 1-3).

16. Regarding claim 23, Kiselev discloses the fixed and excitable layers separated by an interlayer (middle copper layer between the free and fixed layers) to magnetically separate both layers (the middle layer is composed of copper, which magnetically separates the layers).

17. Regarding claims 24, 25, and 27, Kiselev discloses a readout structure (bias structure, swept signal generator, mixer, filter, diode detector, ect; see Fig.1a) that measures the excitation caused by the spin polarized current passing through the magnetic excitable layer (in the form of the microwave frequency; see page 380, column 2, third paragraph), magneto-resistance generated by the fixed and free layers (see Fig.1(c)), and resistance change (i.e. differential resistance, see Fig.1(b)); between two electrodes in electrical contact with said excitable layer (i.e. between each Cu electrode electrically coupled to the free layer).

18. Regarding claim 28, since the circuit of Fig.1a is capable of measuring a change in resistance, the circuit of Fig.1a must also be capable of measuring a change of resistance in a lateral geometry.

Allowable Subject Matter

19. Claims 3, 4, 6, 8-12, 14-20, 26, and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

20. In light of the filed amendments, the objections to the drawings, specification, and claim 17 presented in the previous action have been withdrawn.

21. Applicant's arguments filed February 17, 2010 have been fully considered but they are not persuasive.

22. Applicant appears to argue that the integrated magnetic field generator of Lagae is non-analogous due to the application of the corresponding magnetic field to a sensor rather than an oscillator (see pages 15-16 of the arguments).

23. In response to applicant's argument that Lagae is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the circuit of Lagae is in the field of integrated spin valve devices (see page 7446, second paragraph, where the sensor is a spin valve device) and also reasonably pertinent to the particular problem with which the applicant was concerned (i.e. applying a magnetic field to a spin valve device).

24. Applicant argues, "The claimed use of an integrated magnetic field generator is significant. The Kiselev device utilizes an external oscillator, which requires a relatively large magnetic field for operation. The claimed 'integrated' device allows the use of a significantly smaller magnetic field".

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25. First, the Examiner notes that there appears to be no specific support in Kiselev, or any particular evidence (i.e. citation) provided by Applicant, that supports the assertion that the oscillator of Kiselev is "external". Kiselev appears silent on whether the oscillator is an "external" oscillator (i.e. external to other components, including the magnetic field generator). Second, the Examiner notes that there are no recitations within the claims that necessarily require "a significantly smaller magnetic field", nor any evidence that the integrated magnetic field generator of Lagae (i.e. parallel nanowires generating a magnetic field via a passing current) would not also provide a similar benefit.

26. Applicant next argues, within the context of the magnetic field generator of Lagae applied to a sensor rather than an oscillator, "This approach is opposite to the claimed 'integrated' element for 'interacting' with the magnetic excitable layer. In contrast to the independent operation of the sensor and magnetic field generator disclosed in the Lagae article, the claimed invention uses the interacting element (e.g., magnetic field generator) to tune the magnetic excitable layer (e.g., oscillator). As described in the specification ... ,such an interaction is significant because, with this approach, the frequency of the generated oscillations 'can not only be selected during designing or production of the device but ... the frequency also can be selected during use...'"

27. However, the Examiner notes that Kiselev already discloses a magnetic field generator interacting with a magnetic excitable layer (see page 380, second column, lines 10-13, which discusses the application of a magnetic field to the oscillator device). Kiselev further discloses tuning the oscillator frequency by tuning both the current and

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magnetic field of the oscillator (see page 382, final paragraph, which states

"Nanomagnets driven by spin-polarized currents might therefore serve as nanoscale microwave sources or oscillators, tunable by I and H over a wide frequency range").

Therefore, since Kiselev already discloses tuning a magnetic field generator to interact with a magnetic excitable layer, the only difference between Kiselev and the recited invention is that the magnetic field generator of Kiselev is not explicitly disclosed as "integrated". As shown above, Lagae discloses that providing an integrated magnetic field generator for a spin valve device via current-carrying conductors is known in the art. As discussed above, one of skill in the art would have found the integrated current conductors of Lagae as useful in providing a reduction of space and ease of manufacture.

28. Finally, Applicant argues, "The magnetic field generator for the Lagae article only has a substantial impact in the 'horizontal' direction (with respect to the layers), rather than in a 'vertical' direction, as shown, for example, in the drawings of the present invention".

29. However, the Examiner notes there is no language in the claim that necessarily requires a magnetic field applied in a vertical direction.

Conclusion

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Stauth et al. (US 7,259,545) also discloses providing a magnetic field (58) by an integrated conductor (64).

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31. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Johnson whose telephone number is (571)270-1264. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert J. Pascal can be reached on 571-272-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. J./
Examiner, Art Unit 2817

/Robert Pascal/
Supervisory Patent Examiner, Art Unit 2817